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EVOLUTION OF HEAT IN MOSCOW BASIN COAL

The evolution of heat in coal is accompanied by a lowering of its calorific value, a drop in its volatile substance content, a rise in its ash content, a decrease in the coal's coking and caking capacity, and an increase in the amount of fines. When Moscow basin coal was stored in a heap 10 meters high, its calorific value decreased 6.5 percent during 3-6 months of storage, according to data of the VTI (All-Union Thermal Engineering Institute imeni Feliks Dzerzhinskiy). Fires accompanying evolution of heat cause even greater damage, often destroying considerable supplies of fuel

One of the difficulties in studying evolution of heat in coal is the great variation in the composition and structure of the coal and in the characteristics of the deposits. As a result, data on coal from some deposits cannot be applied to coal of similar types from other deposits without corroboratory tests.

Tests for the evolution of heat in Moscow basin coal were made by the adiabatic method. An automatic photoelectric heat regulator was set up in an adiabatic calorimeter. A sample of fuel, dried for 6 hours in a current of nitrogen at a temperature of 105 degrees, was moved to the reaction chamber and submerged in an oil bath. Nitrogen was, at first, conducted through the reaction chamber. Then, to achieve the thermoequilibrium of the calorimeter (the temperature of the oil bath varied less than 0.01 degree centigrade during 10-15 minutes), the flow of nitrogen was discontinued and oxygen was transmitted to the chamber. From that moment evolution of heat started in the fuel in the reaction chamber. With the increase of the temperature of the coal sample 0.005 degree centigrade above that of the oil bath, the oil bath began automatically to warm up.

Experiments indicated that Moscow basin coal evolves heat in the presence of oxygen regardless of the original temperature of the coal used for the experiment, but that this evolution of heat increases as the temperature increases.

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As to what temperature the coal may safely reach, it was determined that even a temperature of 40-50 degrees centigrade may be dangerous, and that above 78-80 degrees the evolution of heat increases so sharply that such a temperature is completely inadmissible in storing coal.

Intense evolution of heat occurs when only a small amount of oxygen reaches the coal, and this increases greatly when larger amounts of oxygen are transmitted. This indicates that the more the air penetrates into coal heaps the more liable they are to spontaneous combustion.

In storing coal it is necessary to follow to the letter instructions on insulating coal heaps against the penetration of oxygen by rolling the coal layer by layer. Storage of coal in concrete pits or in stacks with compulsory rolling is the best way to keep oxygen from penetrating to the coal.

Data has been obtained to the effect that coal dust with particles less than 0.2 millimeter in size contained in a coal layer is less liable to spontaneous combustion than pieces of coal from 0.2 to 2.5 millimeters in size.

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